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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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WPAT, PC
7225 BEVERLY ST.
ANNANDALE, VA 22003

EXAMINER

BOOTH, RICHARD A

ART UNIT	PAPER NUMBER
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2812

MAIL DATE	DELIVERY MODE
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05/31/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/758,132

Applicant(s)

JENG ET AL.

Examiner

Richard A. Booth

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 17-33 is/are pending in the application.
- 4a) Of the above claim(s) 19,20,28,29 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 17-18, 21-27, 30-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Newly submitted claims 19-20, 28-29, and 33 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: they are not directed to the patentably distinct embodiment where the dielectric layers are an oxide, a nitride, and another oxide layer, respectively.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 19-20, 28-29, and 33 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 17-18, 21-25, 27, and 30-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Bass, Jr. et al., U.S. Patent 4,870,470.

Bass, Jr. et al. shows the invention as claimed including a non-volatile memory structure comprising: a substrate; a plurality of gate dielectric layers disposed on the substrate, wherein at least one hetero element provides at least an increased electron trapping density in the gate dielectric layers; a gate electrode layer 35 formed on the top of the gate dielectric layers; and a source/drain electrode formed at the substrate on both sides of the gate dielectric layer (note that source/drain electrodes will inherently need to be formed in order to enable interconnection with other devices).

With respect to claims 18, 22, 25, and 31, note that the gate dielectric layers include a first silicon dioxide layer 20, a silicon nitride layer 30, and a second silicon dioxide layer 25.

Concerning claims 21, 27, and 30, note that the at least one hetero element is silicon based on the silicon rich nitride material.

Claims 17-18, 21-25, and 30-32 are rejected under 35 U.S.C. 102(e) as being anticipated by Zheng et al., U.S. Patent 7,015,101.

Zheng et al. shows the invention as claimed including a non-volatile memory structure comprising: a substrate; a plurality of gate dielectric layers (112,114,500) disposed on the substrate, wherein at least one hetero element provides at least an increased electron trapping density in the gate dielectric layers; a gate electrode layer 800 formed on the top of the gate dielectric layers; and a source/drain electrode formed at the substrate on both sides of the gate dielectric layer (note that source/drain

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electrodes will inherently need to be formed in order to enable interconnection with other devices---also see fig. 9 and col. 7-line 41 to col. 8-line 30).

With respect to claims 18, 22, 25, and 31, note that the gate dielectric layers include a first silicon dioxide layer 112, a silicon nitride layer 114, and a second silicon dioxide layer 500.

Concerning claims 21 and 30, note that the at least one hetero element is nitrogen or oxygen.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bass, Jr. et al., U.S. Patent 4,870,470 in view of Walker et al., U.S. Patent 5,371,027 and Naguib et al., U.S. Patent 4,683,645.

Bass, Jr. et al. is applied as above but does not expressly disclose using Ge as the hetero element.

Walker et al. discloses the use of silicon into the gate tunneling layer in order to improve the tunneling characteristics (see abstract). Additionally, Walker et al. discloses that heavy ions can also be used and Naguib et al. discloses Ge as a heavy ion (see abstract). In view of this disclosure, it would have been obvious to one of

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ordinary skill in the art at the time the invention was made to modify the process of Bass, Jr. et al. so as to use Ge as suggested by Walker et al. and Naguib et al. because Germanium is disclosed to be a suitable material.

Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al., U.S. Patent 7,015,101 in view of Walker et al., U.S. Patent 5,371,027 and Naguib et al., U.S. Patent 4,683,645.

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Response to Arguments

Applicant's arguments with respect to claims 17-18, 20-27, and 31-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is (571) 272-1668. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Richard A. Booth
Primary Examiner
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May 28, 2007